# REVIEWS

**An Introduction to Atmospheric Physics.** By R. G. FLEAGLE and J. A. BUSINGER. Academic Press, 1963. 346 pp. $12.00.

This book is volume 5 of the International Geophysics Series, but it covers a wider range of subjects in less detail than previous volumes and is not intended for use as a reference in the same way. In the words of the authors' preface, it 'is addressed to those who wish to understand the relationship between atmospheric phenomena and the nature of matter as expressed in the principles of physics'. It is written at the level of final-year undergraduates or first-year graduate students in the atmospheric sciences, and it seems to accomplish its stated purpose very well.

Some of the topics covered are standard in physical meteorology texts, and some are unusual, but they are all well organized within the framework of the seven chapters, and the book is very readable. The chapter headings, and some of the subjects discussed in them, are: Gravitational effects; Properties of atmospheric gases (kinetic theory, some thermodynamics, moist air); Properties and behaviour of cloud particles (growth by condensation and accretion, electrical effects); Solar and terrestrial radiation (radiative transfer and absorption, photochemical processes); Transfer processes and applications (mostly transfer near the earth's surface, and associated phenomena such as fog); Geomagnetic phenomena (a summary of basic electromagnetic theory, applied to the geomagnetic field, the ionosphere and aurorae). The final chapter, entitled 'Atmospheric signal phenomena', might well have been expanded into several, since it contains discussions of wave motion, scattering, atmospheric probing by radio and acoustic methods, refraction, and miscellaneous effects of nuclear explosions.

The selection of subjects and the emphasis each is given must of course be a personal one; a notable omission here is any discussion of atmospheric motions (except in a limited way in the chapter on turbulent transfer), but these are to be treated in a later volume. In places the writing is almost too well-ordered and clear-cut, since the authors do not often attempt to discuss different and sometimes conflicting views about actively developing subjects. For example, in their discussion of the diabatic atmosphere no mention is made of important Russian work; and one is given little impression of the current controversy over mechanisms of charge separation (apart from the warning that 'here we encounter once again, while walking rapidly, a slowly opening door'!). There is, however, a fresh and critical examination of old ideas and the principles behind them. Thus the 'greenhouse effect' is sensibly renamed the 'atmosphere effect', because the heating of a greenhouse in fact has little to do with the absorption of long-wave radiation by the glass.

There are frequent references to original sources, from the *Principia* to those as recent as the year of publication. At the end of each chapter is a list of general references, all readily available books, with comments on the scope of each which

should be a helpful guide to further reading. Also provided are detailed lists of symbols, and sets of problems. The printing and layout are excellent, and the figures large and clear. Features which will probably strike British readers in particular as surprising and unnecessary are the appendices containing elementary mathematical and physical topics. The book takes a general background of physics for granted in any case, and no book aimed at graduate students can be expected to supply such details.

*An Introduction to Atmospheric Physics* looks as if it would be a fine book to teach from, and indeed it has grown out of a course given by the authors and their colleagues over a number of years. It provides a theme to link together topics in classical physics which nowadays are too often regarded as a traditional but almost irrelevant prelude to 'modern', usually nuclear, physics. Books such as this, and teaching based on them, can perform a service both to physics and the geophysical sciences. They will help to restore some of the balance and make subjects like meteorology really part of physics again, but with an added challenge: the need to understand not only the isolated parts of a problem, but also the way they fit together and interact to produce the complex phenomena we observe.

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